Cod, Presley, Hull, Bridgeman, Rogers, Cubitt, and Hack Creeks

Northumberland County, Virginia

First Shellfish TMDL Development Public Meeting

June 24, 2009
Heathsville, VA

VIRGINIA DEPARTMENT OF ENVIRONMENTAL QUALITY

What is a TMDL?

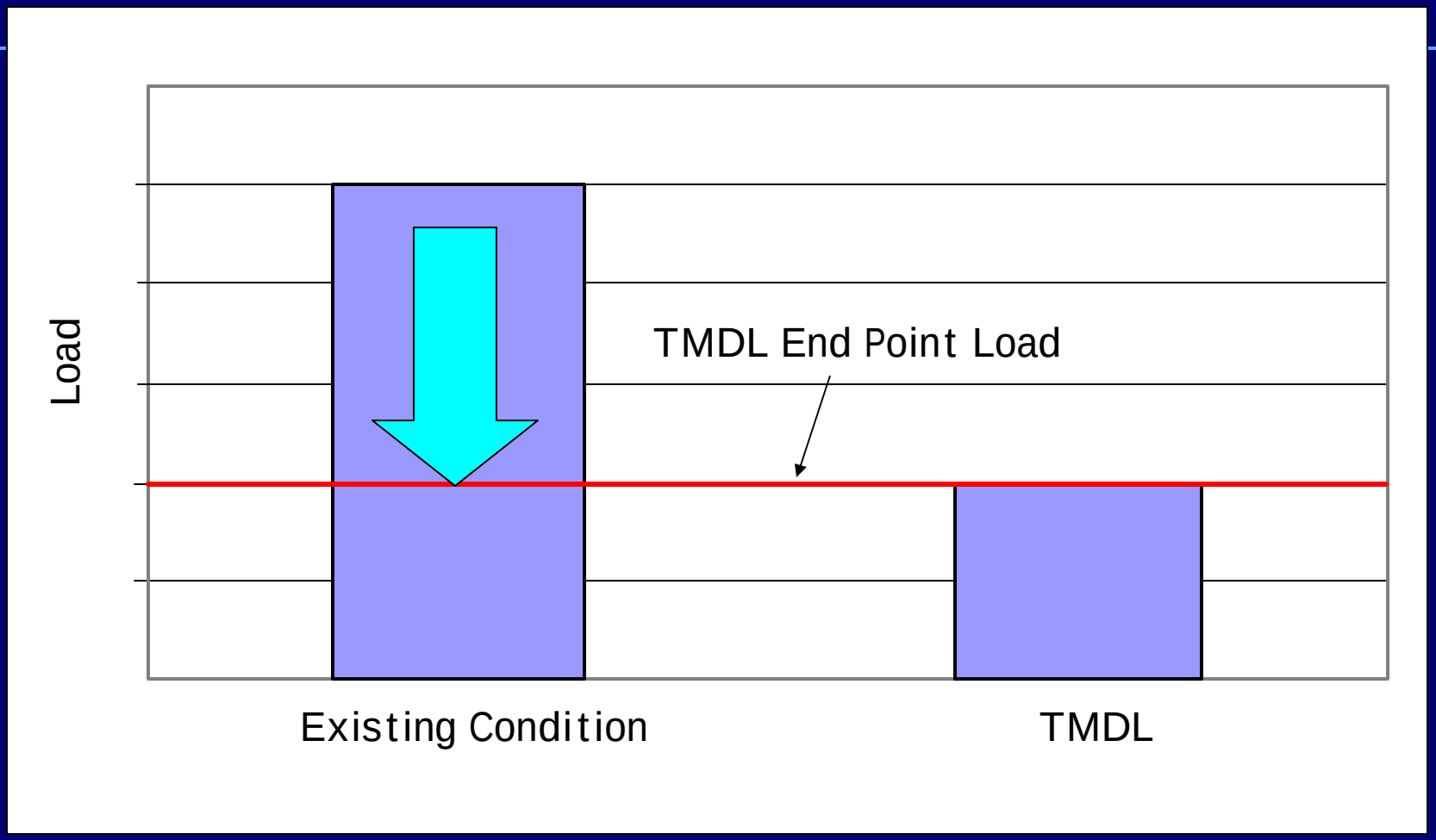
TMDL = Total Maximum Daily Load =

maximum amount of a pollutant that a waterbody can contain without violating water quality standards (WQS)

WQS = numeric or narrative limits on pollutants that ensure the protection of human health and aquatic life

DEQ
VIRGINIA DEPARTMENT OF ENVIRONMENTAL QUALITY

An Example TMDL



Reducing existing bacteria load to the TMDL end point load is expected to restore water quality. The "end point" is the water quality standard.

Why are TMDL studies necessary?

- TMDLs must be developed for waters that do not meet water quality standards (impaired waters).
- Impaired waters occur throughout Virginia in lakes, streams, and tidal waters.
- In Virginia, TMDLs for 35± impaired waters must be developed by May 2010.
  - Of these, 5± are shellfish TMDLs
  - There are >1700 TMDLs to be done as of 2008

VIRGINIA DEPARTMENT OF ENVIRONMENTAL QUALITY

What information is used to develop a TMDL?

- VDH Sanitary Shoreline Survey
- VDH Bacteria monitoring data
- Population estimates for humans, pets, wildlife, livestock (Census, VIMS, DCR, DGIF, & the public)
- Affected waters volume
- Bacterial Source Tracking Data (BST)
- Land Use, Climate, Tide, etc.
- DEQ permit data
- DEQ spill response and remediation data

DEQ
VIRGINIA DEPARTMENT OF ENVIRONMENTAL QUALITY

Virginia's TMDL Development Process

- Public notice, meetings and comment period for upcoming TMDL
- TMDL Study
- Public notice, meetings and comment period for Draft TMDL
- Final TMDL report
- EPA and SWCB approval
- Implementation process

= = > * *Many opportunities for public input and participation!* *

DEQ
VIRGINIA DEPARTMENT OF ENVIRONMENTAL QUALITY

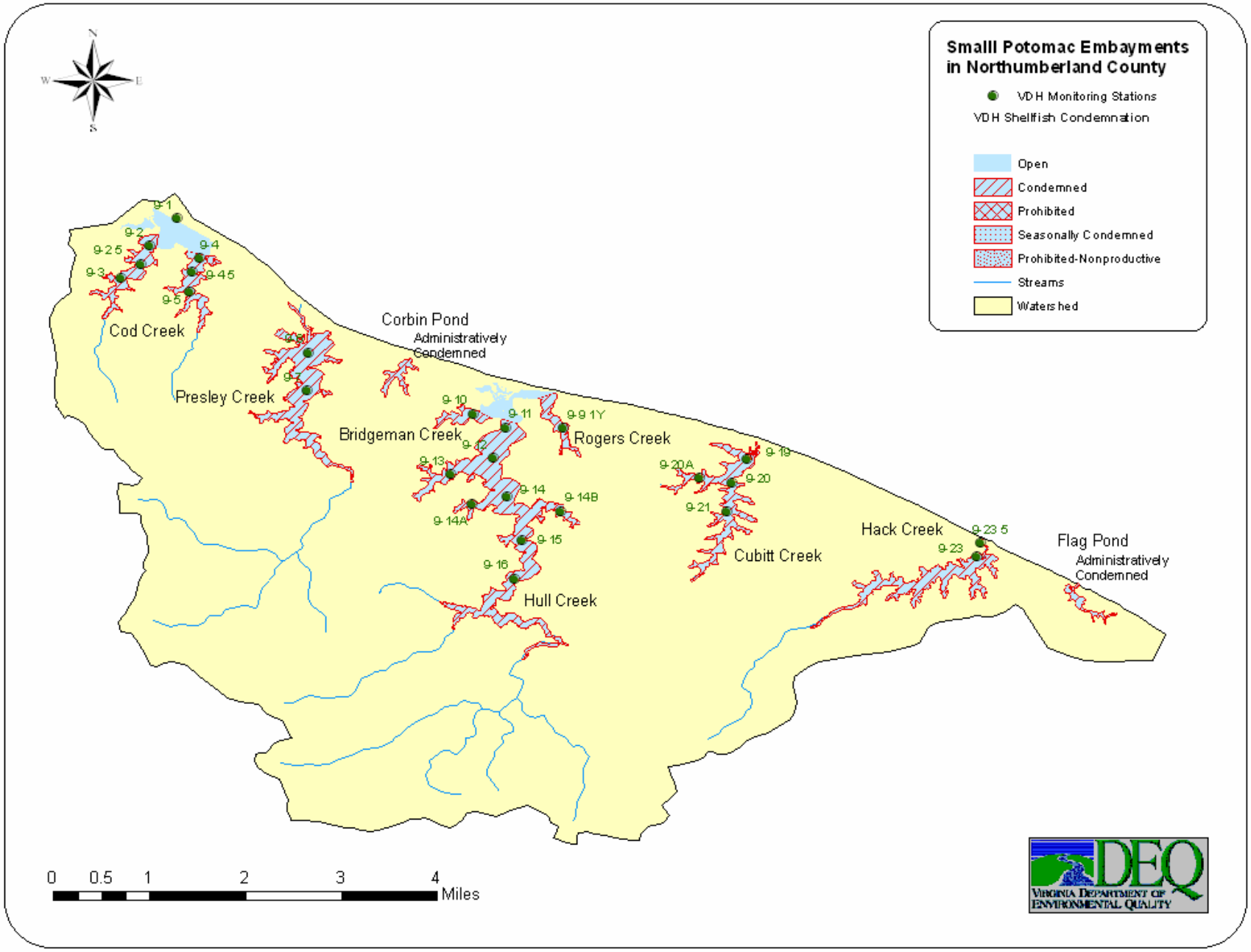
People involved in the Process:

- Virginia Department of Health - Division of Shellfish Sanitation
- Virginia Department of Conservation and Recreation
- Virginia Department of Environmental Quality
- Other State Agencies, Local Governments and Planning Districts
- U.S. Environmental Protection Agency and other appropriate federal agencies
- Citizens groups, educational institutions environmental groups, & local business
- **YOU**!

Why is a TMDL needed for these Watersheds?

- VDH Division of Shellfish Sanitation (DSS) monitors fecal coliform levels in shellfish waters
- Applicable water quality standards
  - 30-month geometric mean not exceeding 14 MPN/100 mL
  - and a 90th percentile not exceeding 49 MPN/100 mL
- The portions of the Presley, Cubitt, Cod, Hull,Rogers, Bridgeman, and Hack Creeks that currently fail these standards are:

VIRGINIA DEPARTMENT OF ENVIRONMENTAL QUALITY


Smalll Potomac Embayments in Northumberland County
VDH Monitoring Stations
VDH Shellfish Condemnation
Open
Condemned
Prohibited
Seasonally Condemned
Prohibited-Nonproductive
Streams
Watershed
N
W
E
S
9-1
9-2
9-25
9-3
9-4
9-45
9-5
Cod Creek
Presley Creek
Corbin Pond
Administratively Condemned
9-6
9-7
9-10
9-11
9-9 1Y
Bridgeman Creek
9-12
9-13
9-14
9-14A
9-14B
9-15
9-16
Hull Creek
Rogers Creek
9-20A
9-19
9-20
9-21
Cubitt Creek
Hack Creek
9-23 5
9-23
Flag Pond
Administratively Condemned
0
0.5
1
2
3
4
Miles
DEQ
Virginia Department of Environmental Quality

Water Quality Data Summary for Cod and Presley Creeks

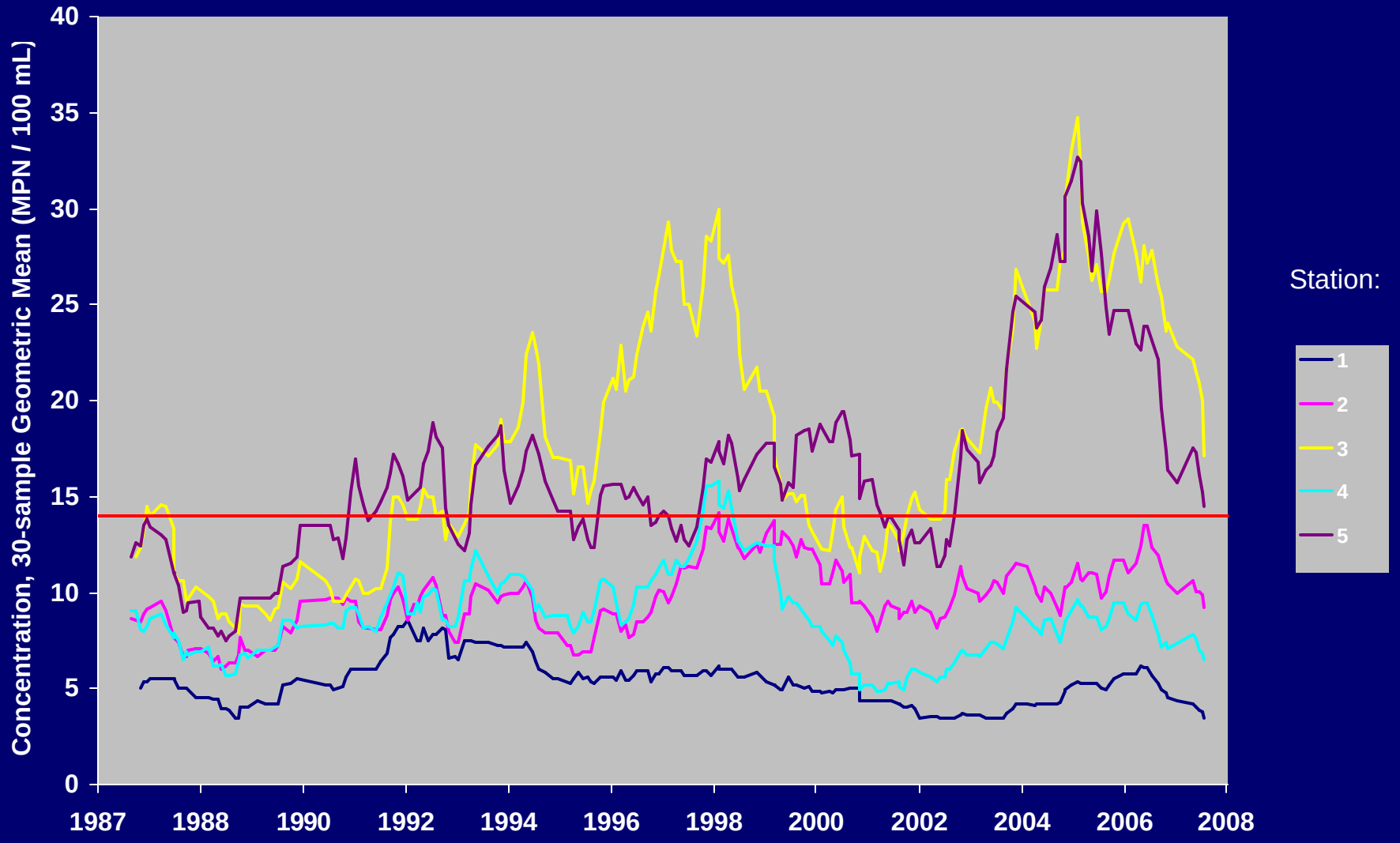
90th Percentile represents the more stringent reduction

Station	Condemnation Area	Total Observations (one/month)	Max. Geometric Mean (14 MPN / 100 mL)	Max. 90th Percentile (49 MPN / 100 mL)
9-1	Cod Creek	243	8.5	**57.1**
9-2	Cod Creek – W	253	**14.1**	**86.3**
9-2.5	"	28	**N/A**	**N/A**
9-3	"	244	**34.7**	**202.5**
9-4	Cod Creek - E	249	**15.8**	**101.5**
9-4.5	"	28	**N/A**	**N/A**
9-5	"	244	**32.6**	**288.3**
9-6	Presley Creek	85	**24.4**	**173.8**
9-7	"	75	**34.0**	**202.8**

DEQ
Virginia Department of Environmental Quality

Cod Creek - Geometric Mean, 1987 - 2008

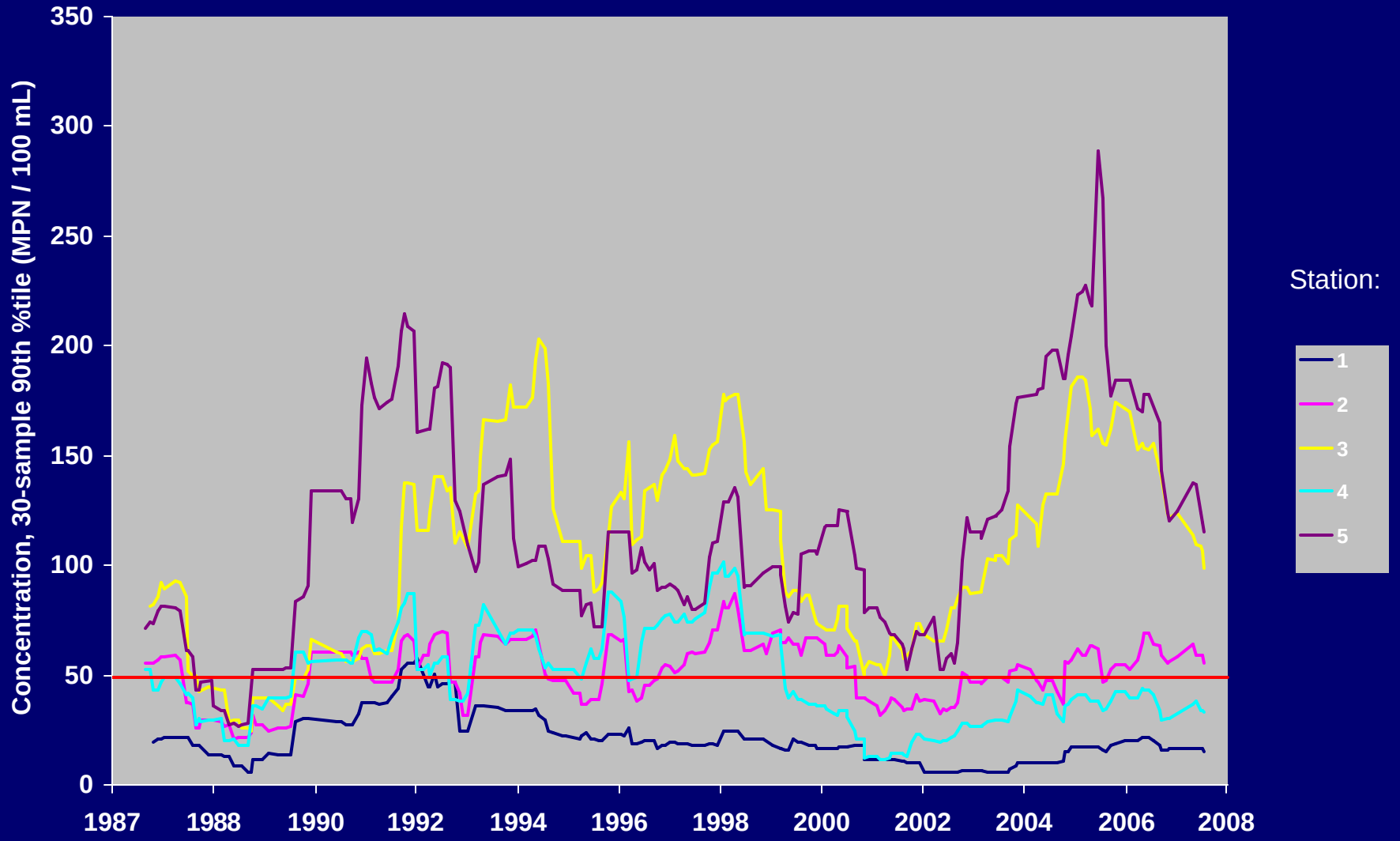
Standard = 14 MPN / 100 mL



DEQ
Virginia Department of Environmental Quality

Cod Creek - 90th Percentile, 1987 - 2008

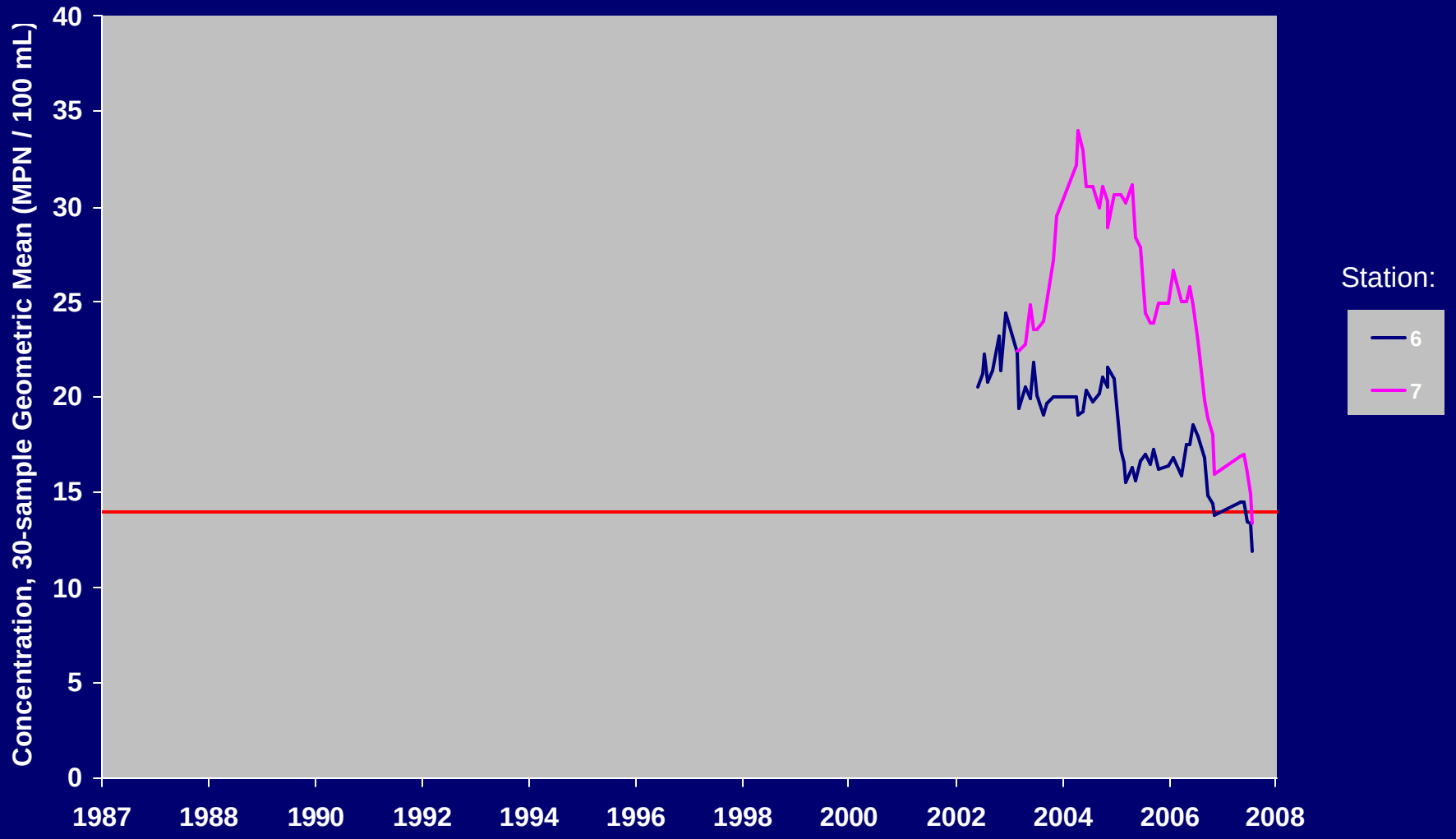
Standard = 49 MPN / 100 mL



DEQ
Virginia Department of Environmental Quality

Presley Creek - Geometric Mean, 2003 - 2008

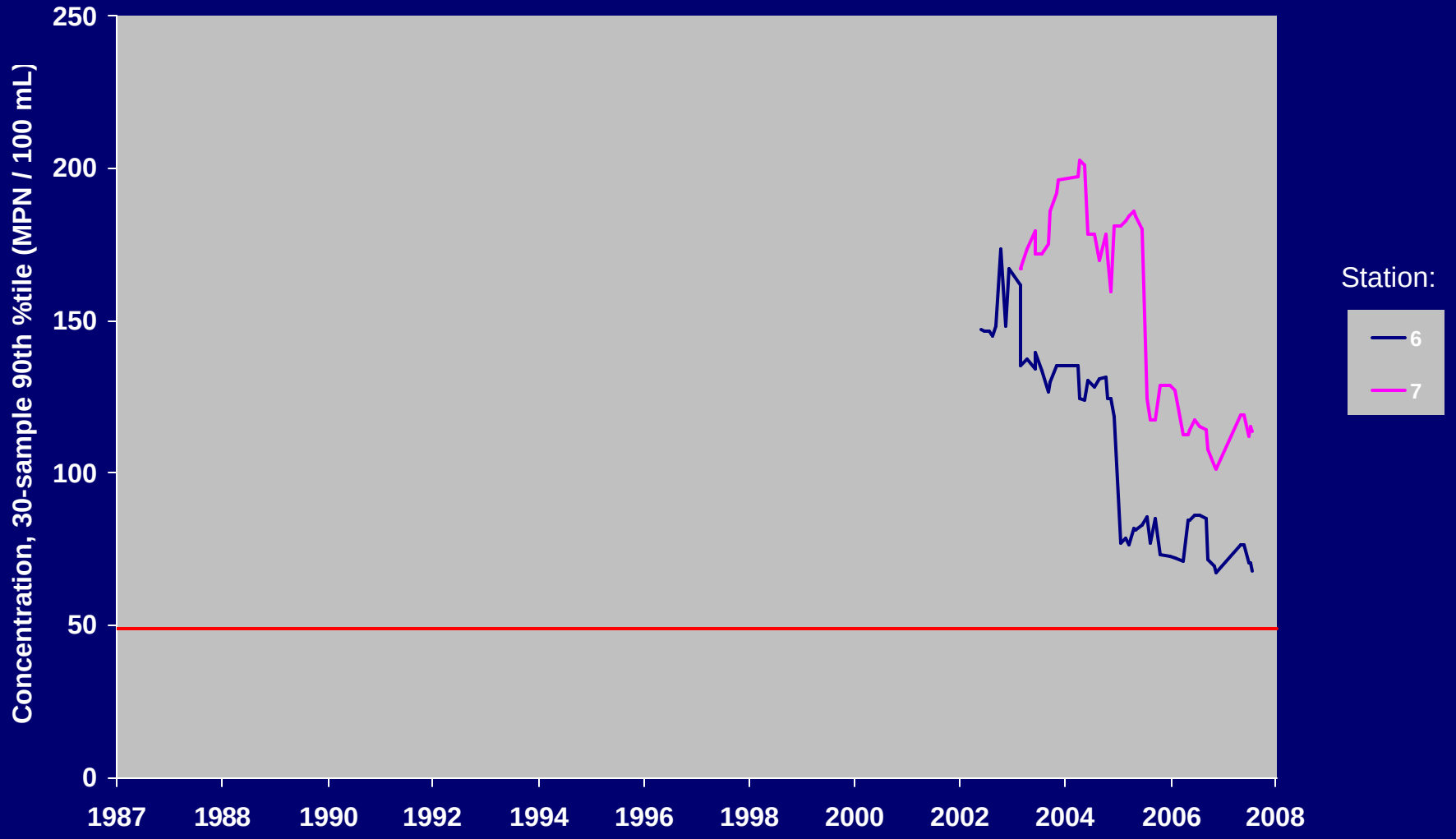
Standard = 14 MPN / 100 mL



Virginia Department of Environmental Quality

Presley Creek - 90th Percentile, 2003 - 2008

Standard = 49 MPN / 100 mL



VIRGINIA DEPARTMENT OF ENVIRONMENTAL QUALITY

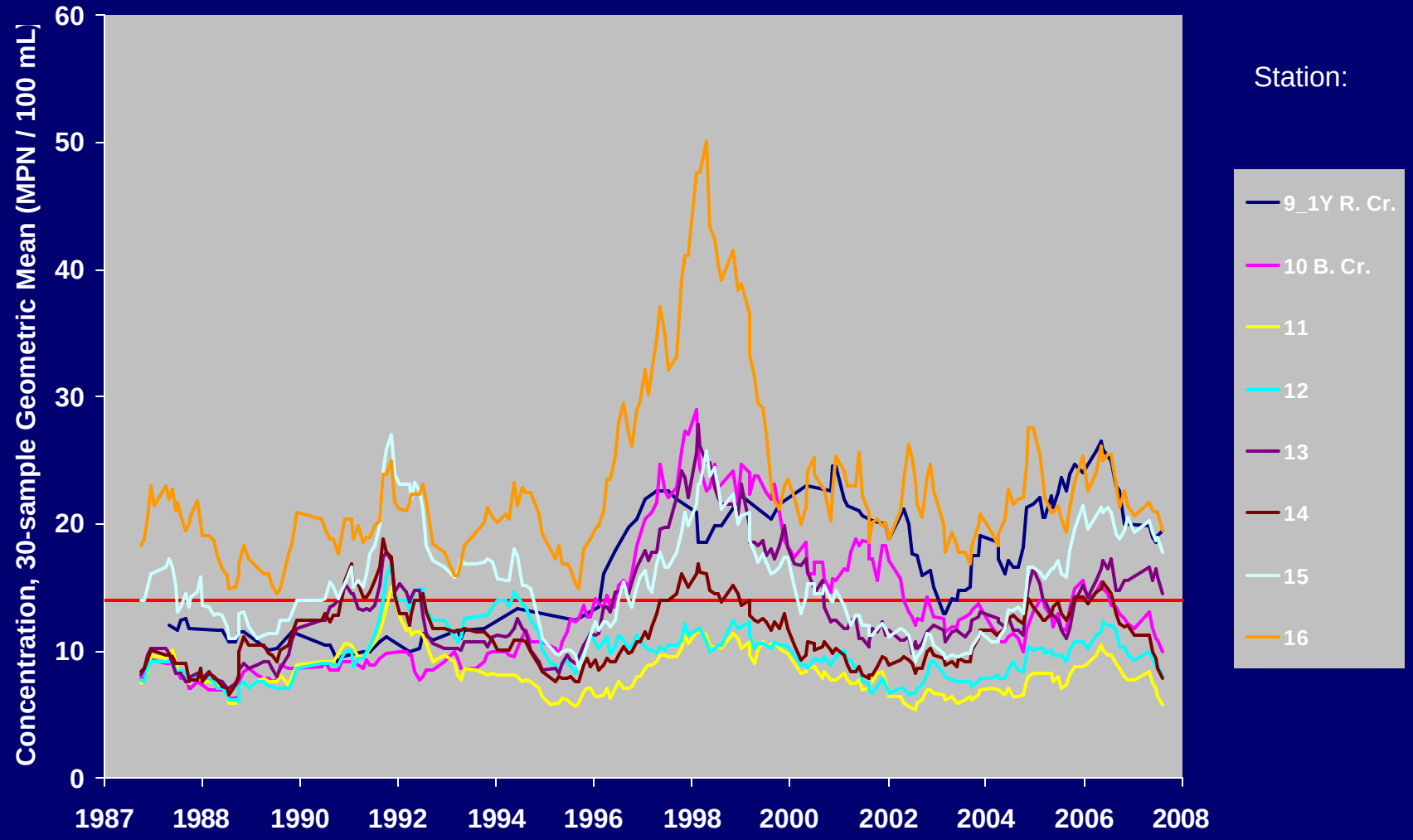
Water Quality Data Summary for Hull, Bridgeman, and Rogers Creeks

Station	Condemnation Area	Total Observations (one/month)	Max. Geometric Mean (14 MPN / 100 mL)	Max. 90th Percentile (49 MPN / 100 mL)
9-10	Bridgeman Ck	239	**29.0**	**198.1**
9-11	Hull Creek	249	**15.0**	**81.3**
9-12	"	250	**16.9**	**129.0**
9-13	"	247	**27.8**	**152.4**
9-14	"	249	**18.8**	**169.9**
9-14A	"	43	**33.0**	**216.5**
9-14B	"	41	**48.7**	**291.7**
9-15	"	249	**27.1**	**205.8**
9-16	"	249	**50.1**	**381.4**
9-9-1Y	Rogers Creek	141	**26.5**	**163.6**

DEQ
Virginia Department of Environmental Quality

Hull Creek - Geometric Mean, 1987 - 2008

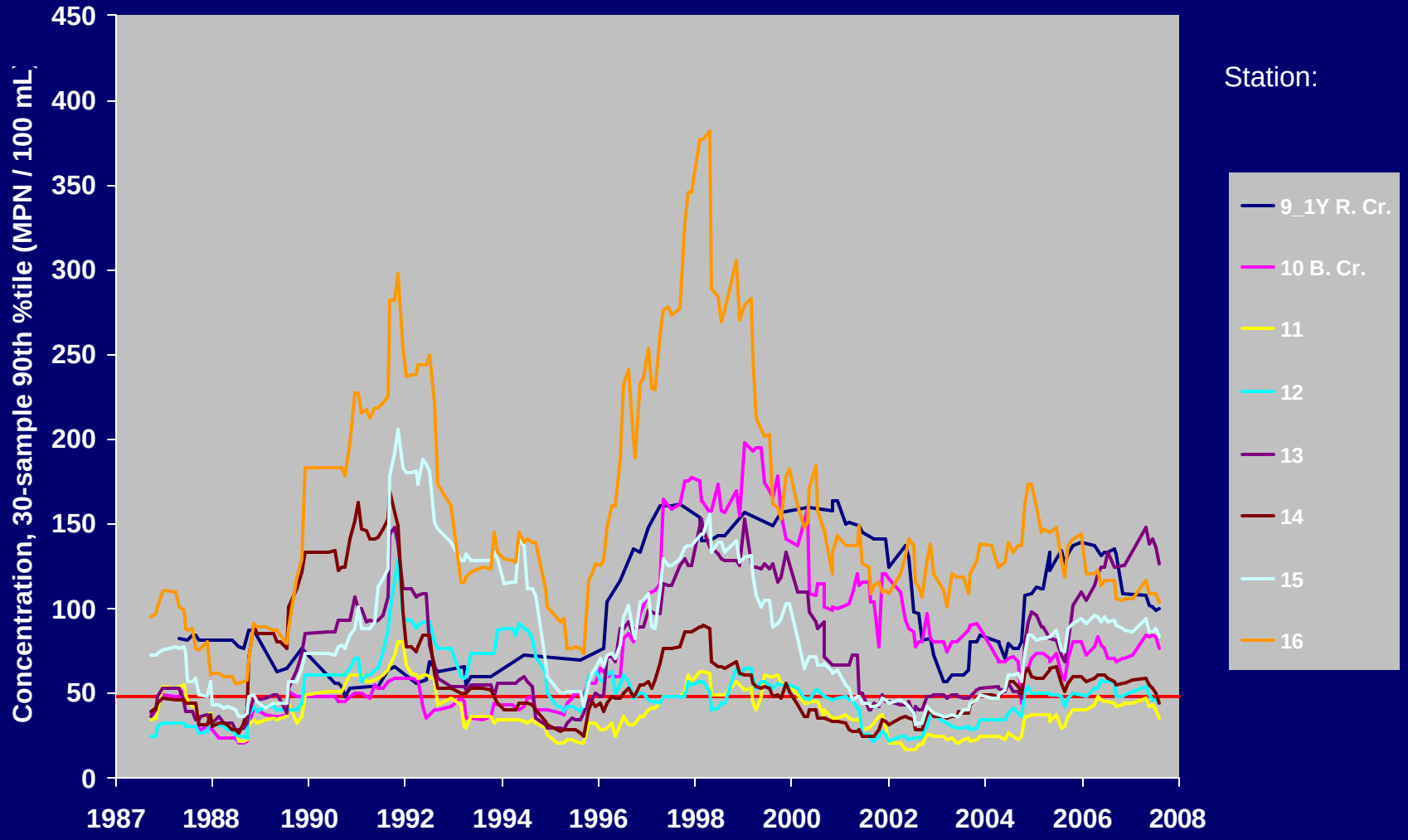
Standard = 14 MPN / 100 mL



Virginia Department of Environmental Quality

Hull Creek - 90th Percentile, 1987 - 2008

Standard = 49 MPN / 100 mL



DEQ
Virginia Department of Environmental Quality

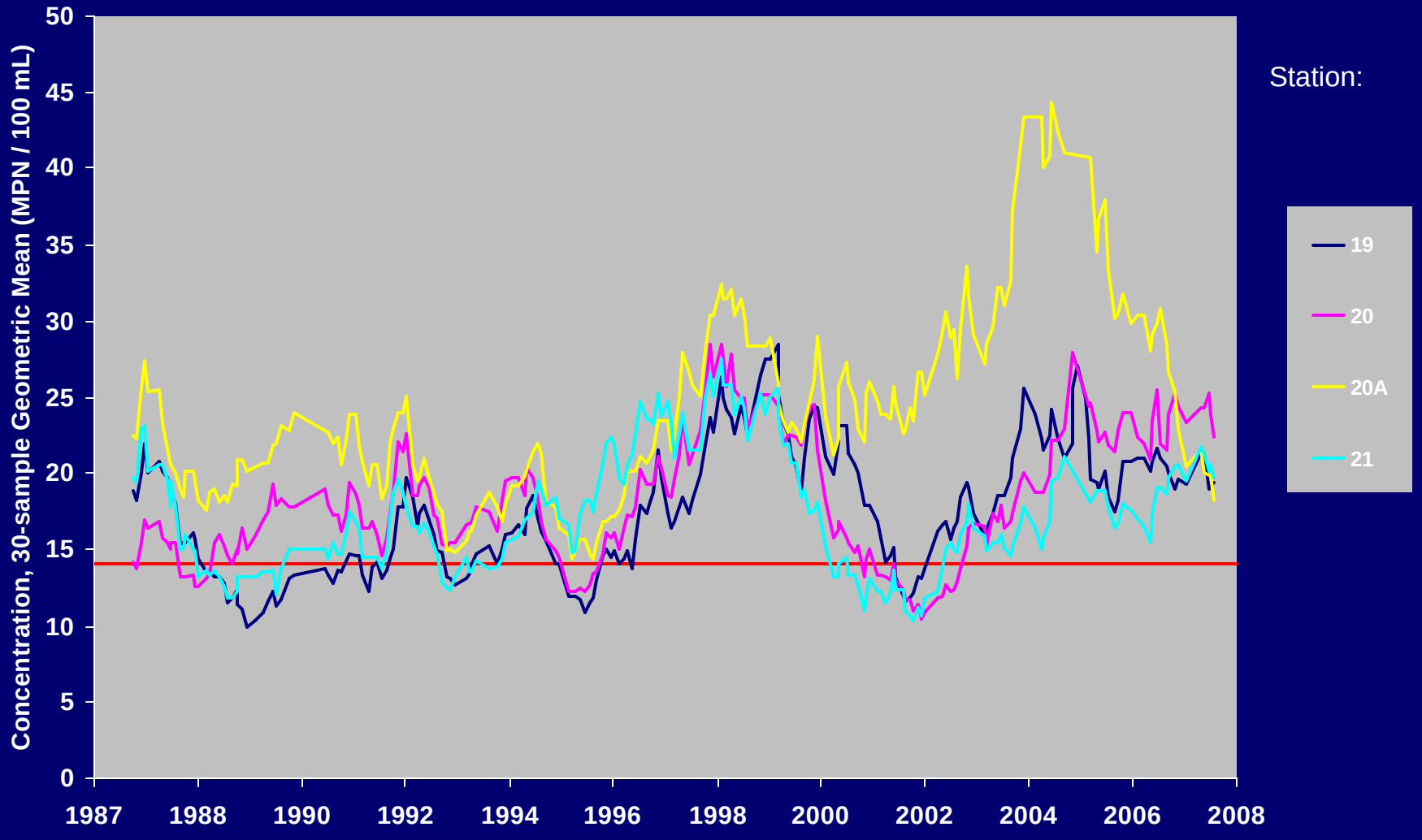
Water Quality Data Summary for Cubitt and Hack Creeks

Station	Condemnation Area	Total Observations (one/month)	Max. Geometric Mean (14 MPN / 100 mL)	Max. 90th Percentile (49 MPN / 100 mL)
9-19	Cubitt Creek***	250	**28.4**	**251.9**
9-20	"	247	**28.5**	**247.2**
9-20A	"	242	**44.4**	**311.5**
9-21	"	245	**27.5**	**212.0**
9-23	Hack Creek	64	**17.8**	**92.8**
9-23.5	"	34	9.8	**54.5**

***Cubitt Creek also violates the Fecal Coliform standard for Recreational Use (higher limit than the shellfish harvest standard)

Cubitt Creek - Geometric Mean, 1987 - 2008

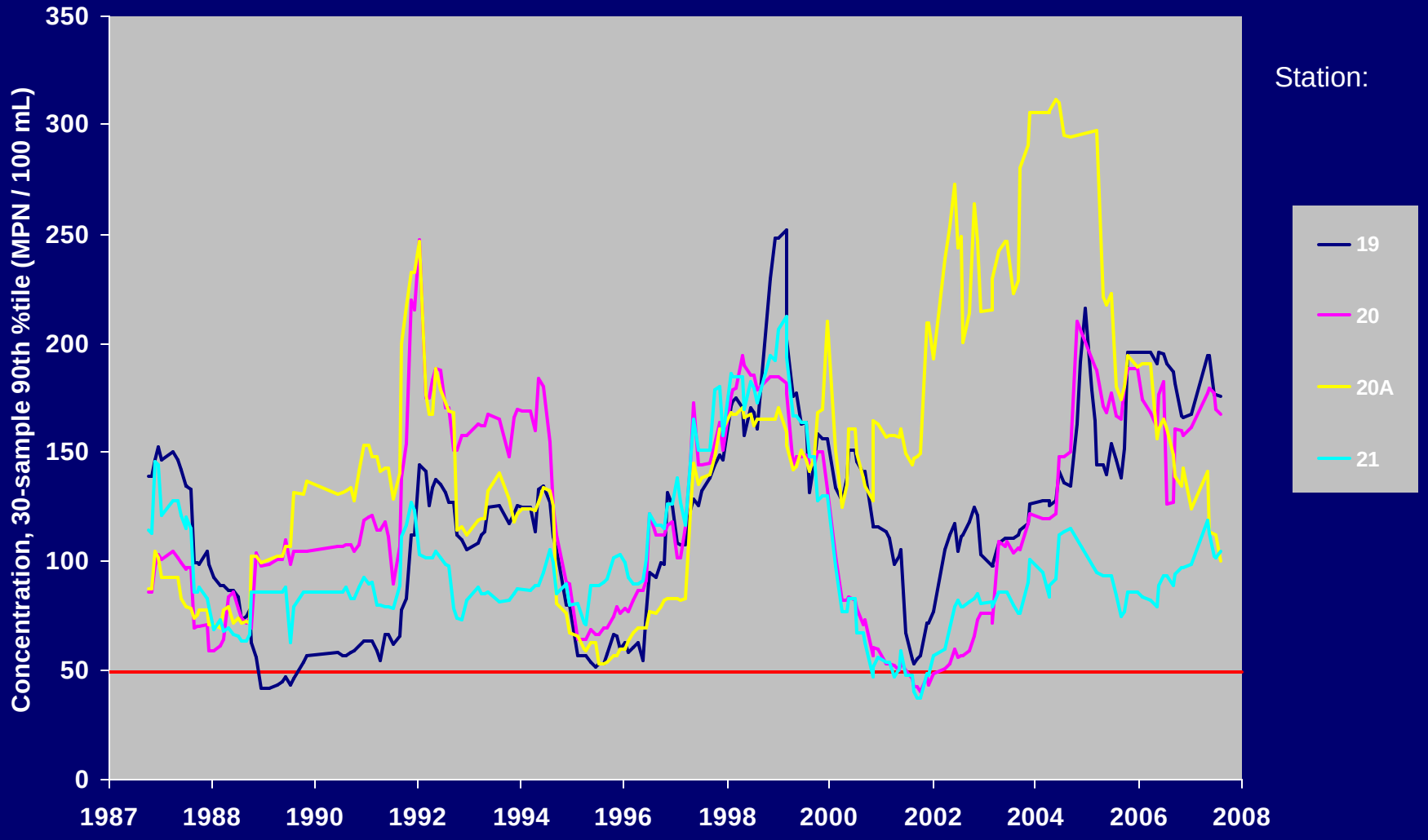
Standard = 14 MPN / 100 mL



DEQ
Virginia Department of Environmental Quality

Cubitt Creek - 90th Percentile, 1987 - 2008

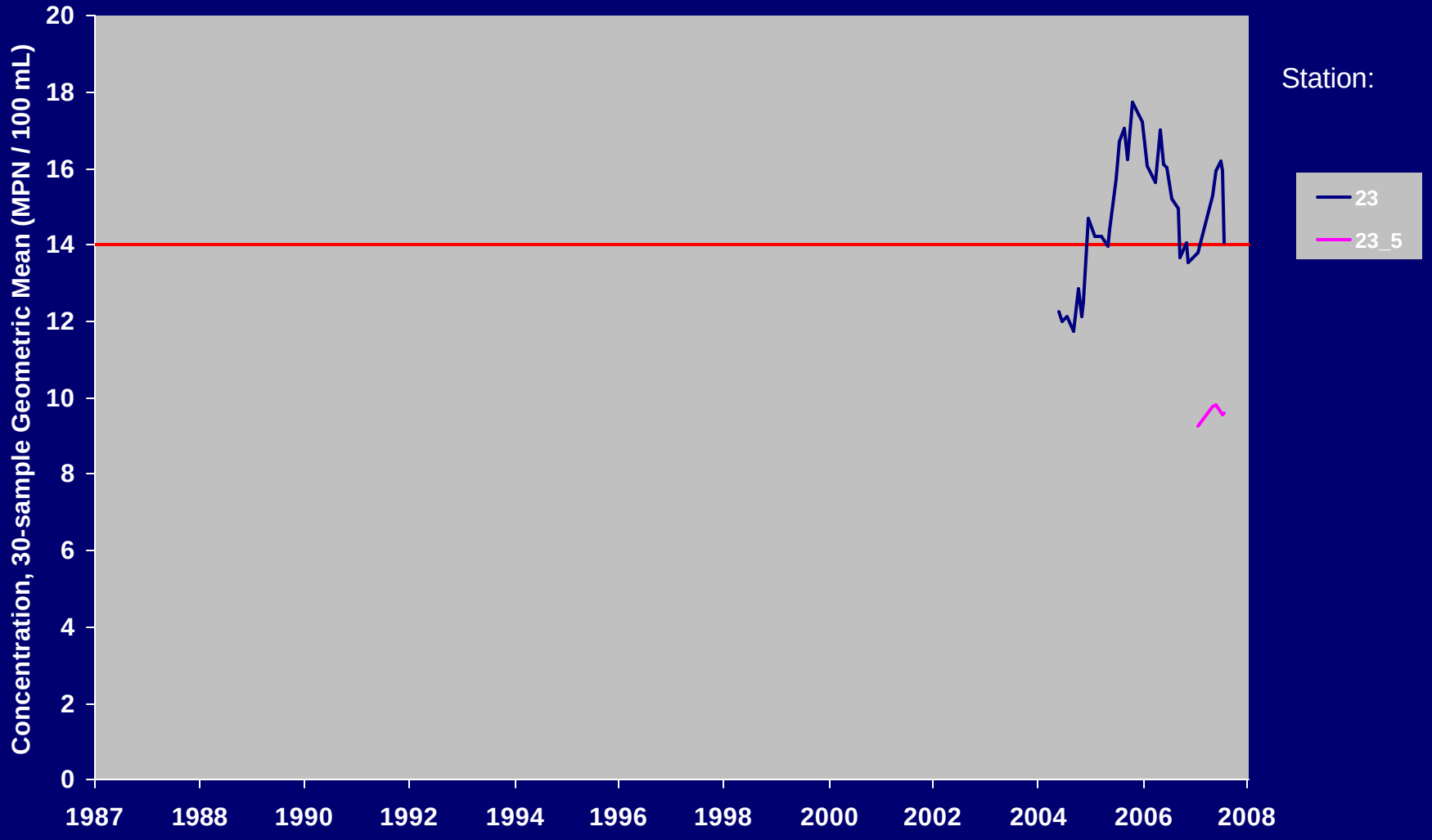
Standard = 49 MPN / 100 mL



Virginia Department of Environmental Quality

Hack Creek - Geometric Mean, 1987 - 2008

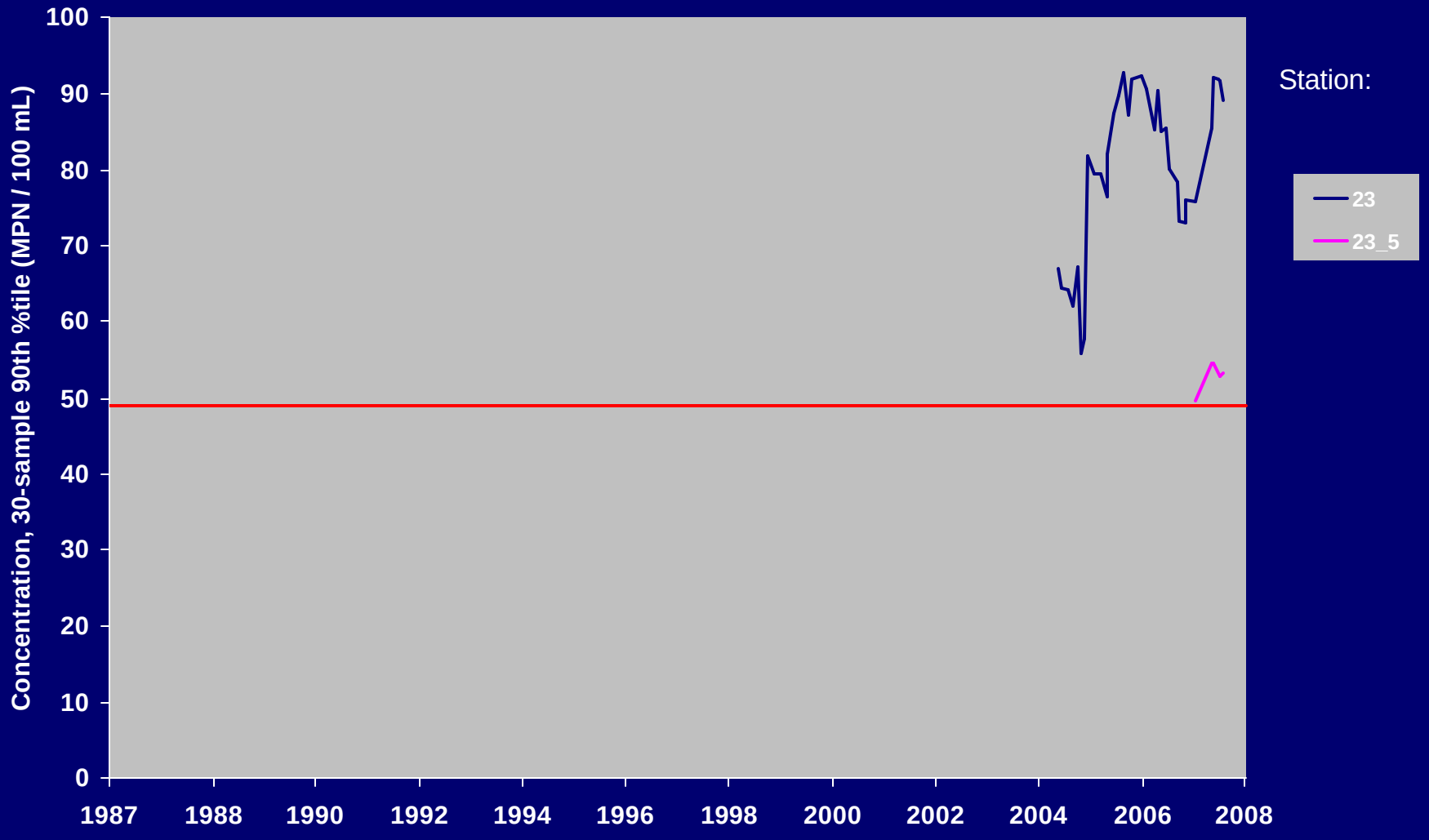
Standard = 14 MPN / 100 mL



VIRGINIA DEPARTMENT OF ENVIRONMENTAL QUALITY

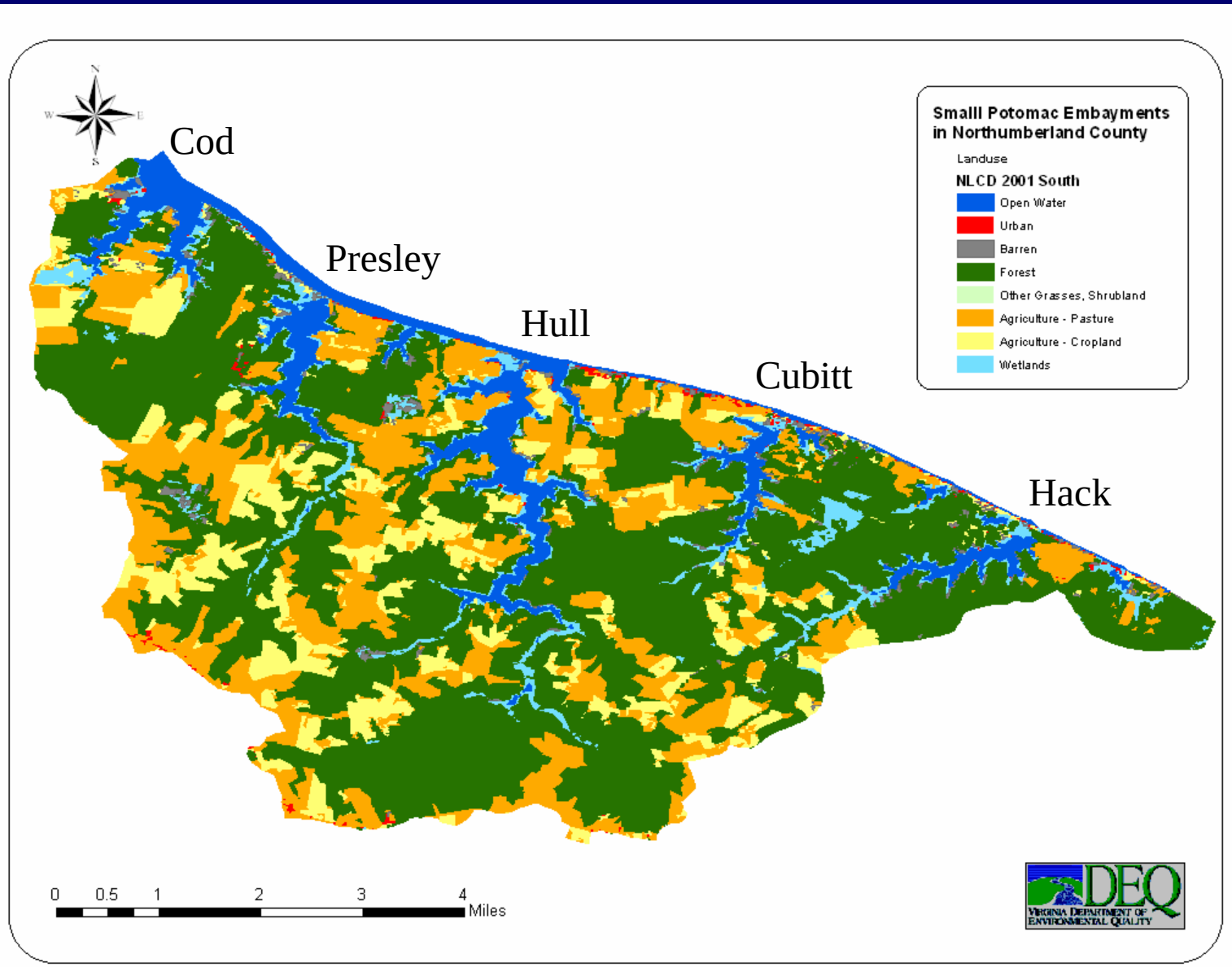
Hack Creek - 90th Percentile, 1987 - 2008

Standard = 49 MPN / 100 mL

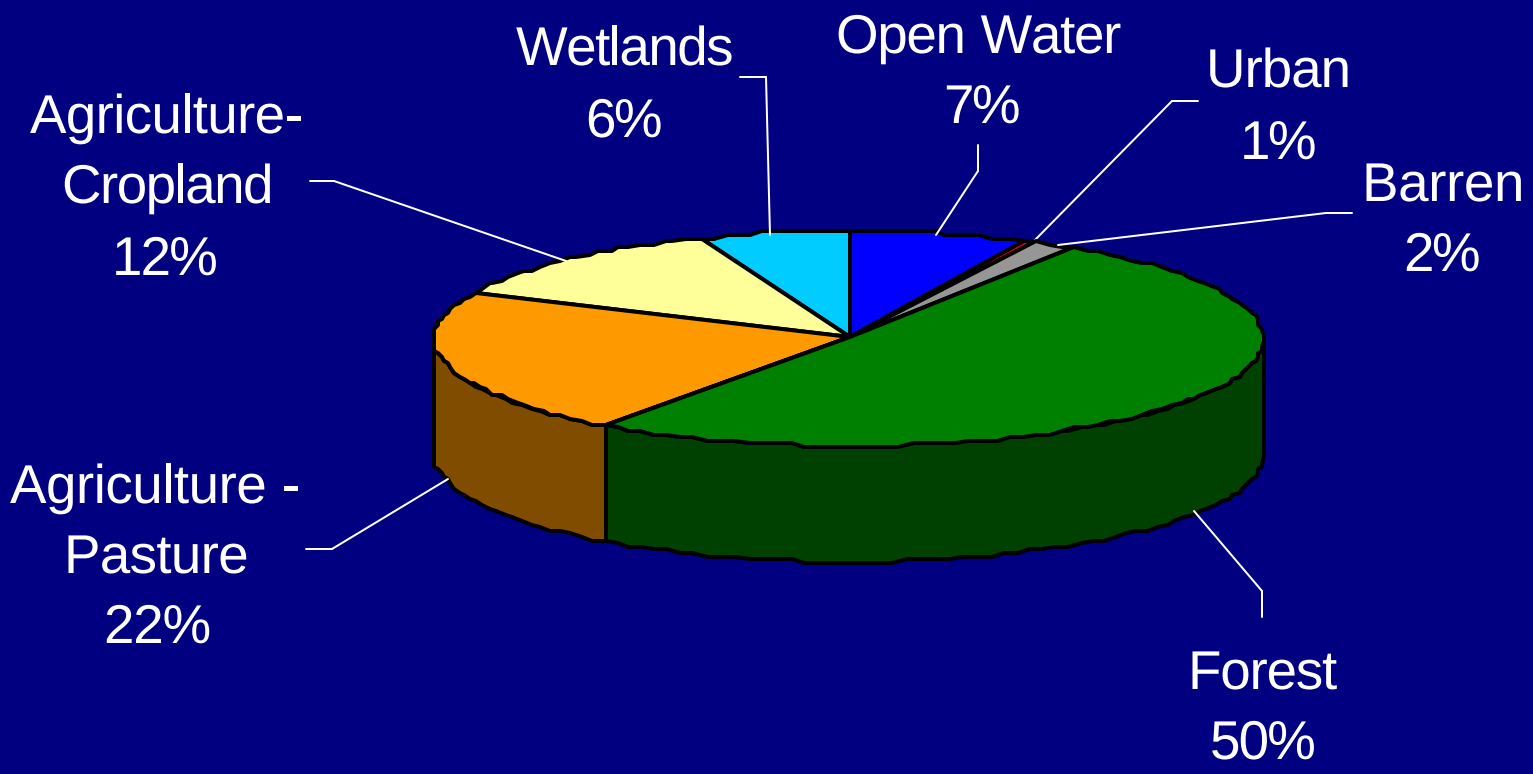


Virginia Department of Environmental Quality

Land Use in the Cumulative Watershed



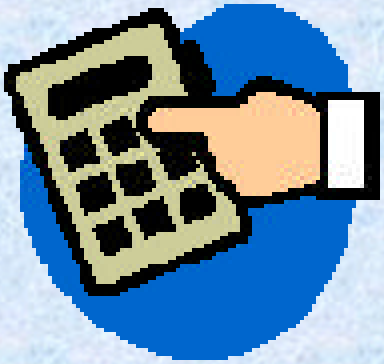
Landuse Percentage by Type



Tidal Volumetric Model + BST TMDL Approach

- Calculate volume of impaired water
- Calculate the acceptable loading;

  Water Quality Standard (WQS) x Volume



- Calculate actual loading;

  Critical (maximum) fecal count x Volume

- Source determination;

  Fecal samples collected for BST are subjected to Antibiotic Resistance Analysis (ARA) and compared with a known fecal “library”

VIRGINIA DEPARTMENT OF ENVIRONMENTAL QUALITY

Use of Bacterial Source Tracking in TMDLs

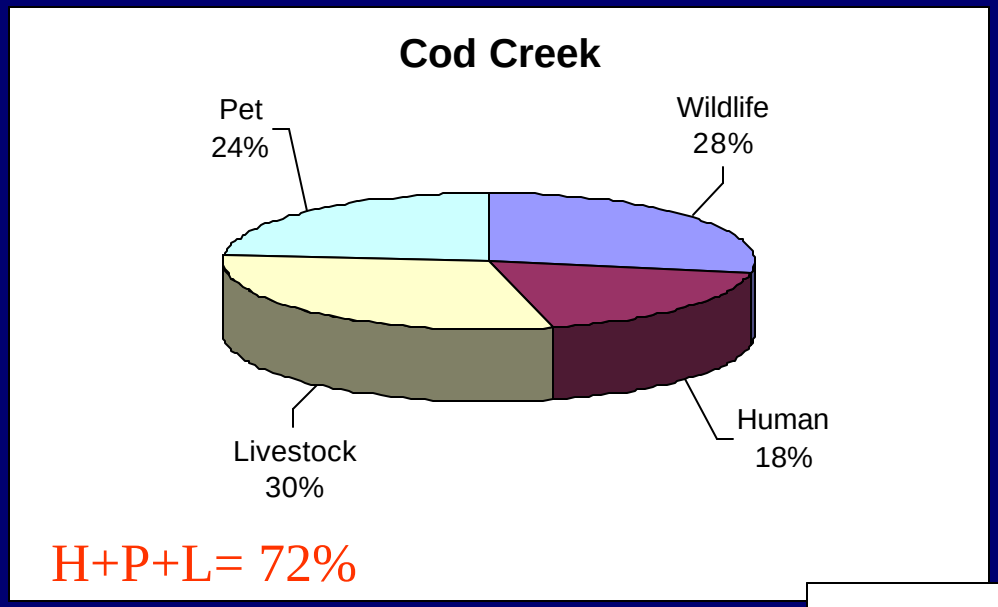
- VDH-DSS monitoring data is used to calculate critical (maximum) fecal count
- Supplementary BST samples at selected stations are used to help identify bacteria sources
- Antibiotic Resistance Analysis - BST method for source load allocation into 4 categories:

1. **Human**
2. **Pets**
3. **Livestock**
4. **Wildlife**

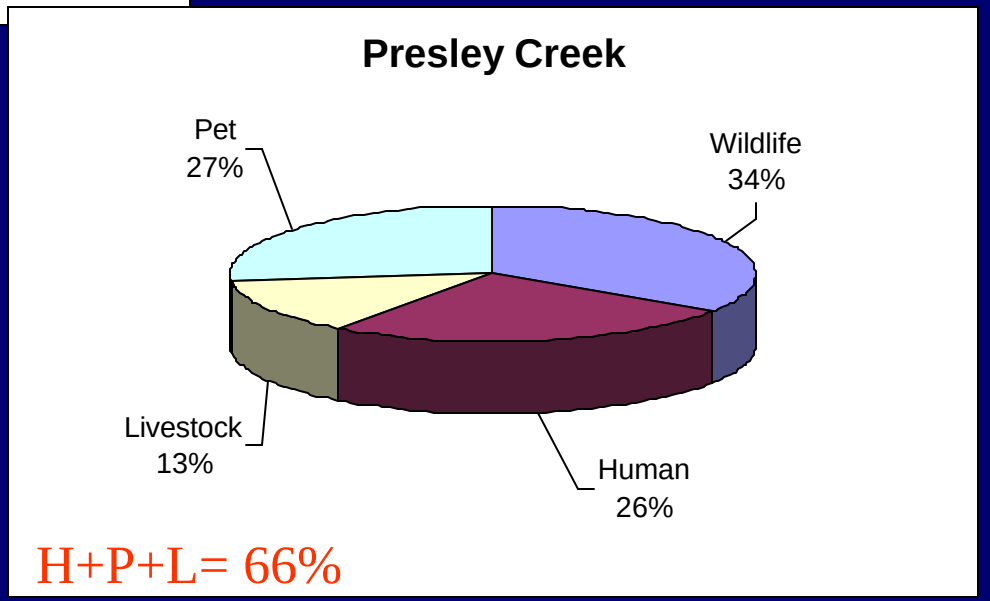
DEQ
VIRGINIA DEPARTMENT OF ENVIRONMENTAL QUALITY

BST Results by Subwatershed

11 Samples each, 10/2005 – 9/2006



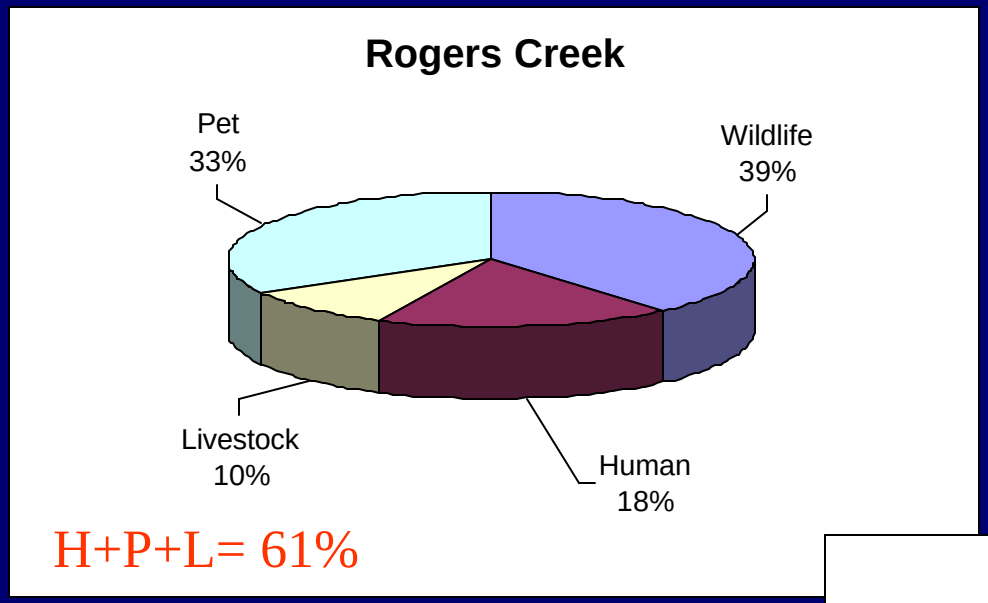
H+P+L= 72%



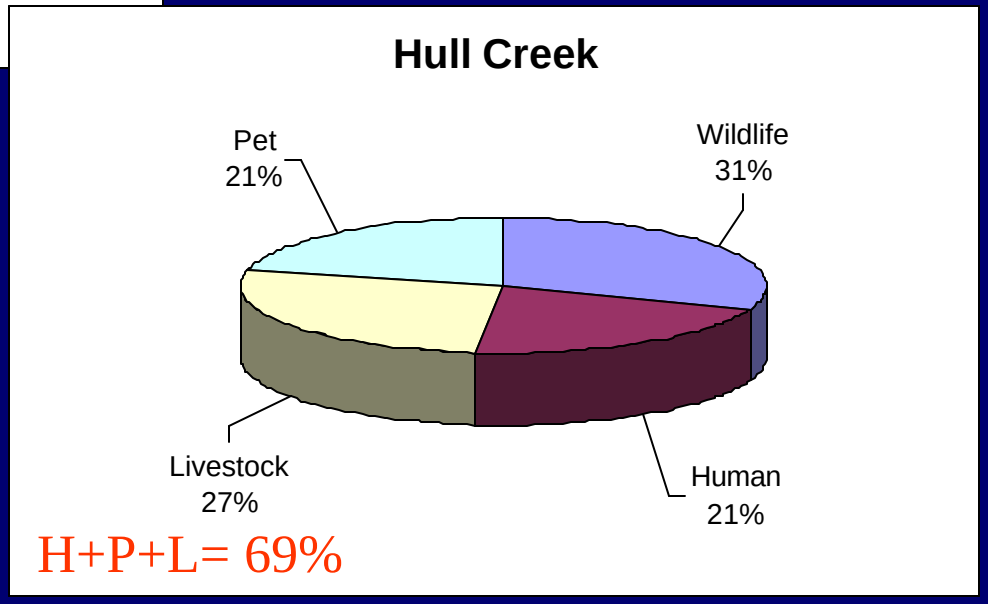
H+P+L= 66%

BST Results by Subwatershed

11 Samples each, 10/2005 – 9/2006



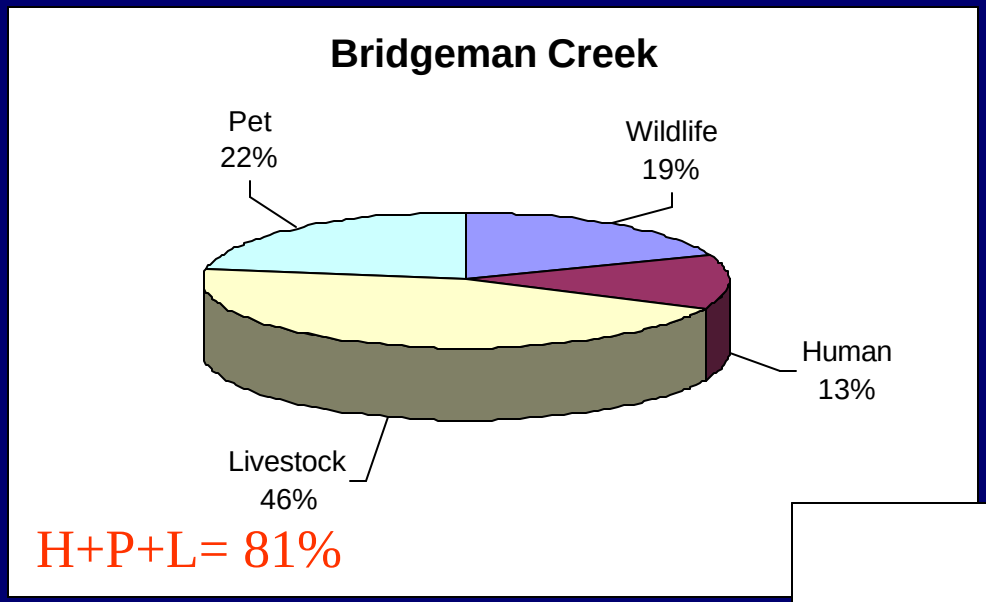
H+P+L= 61%

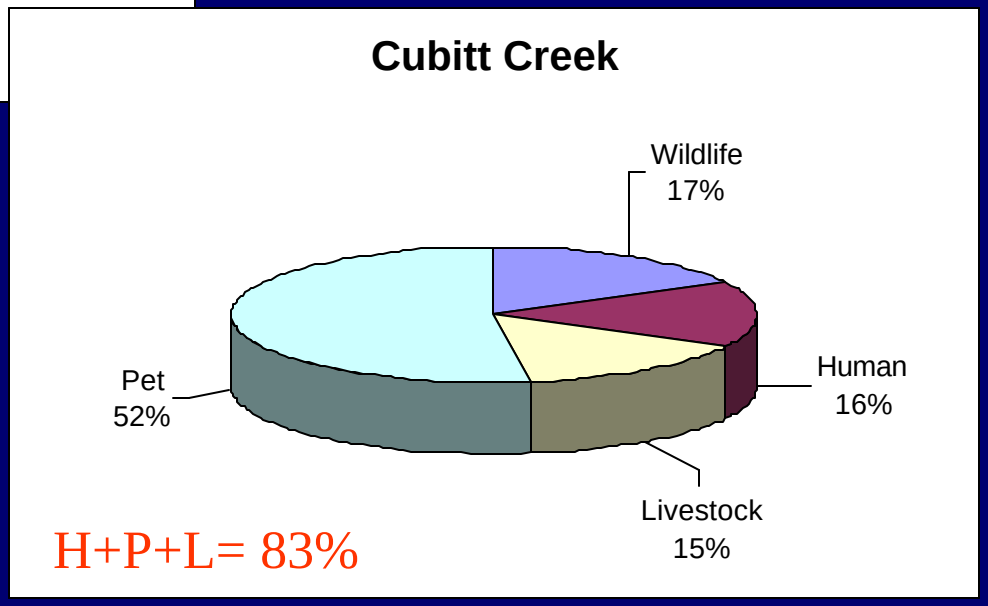


H+P+L= 69%

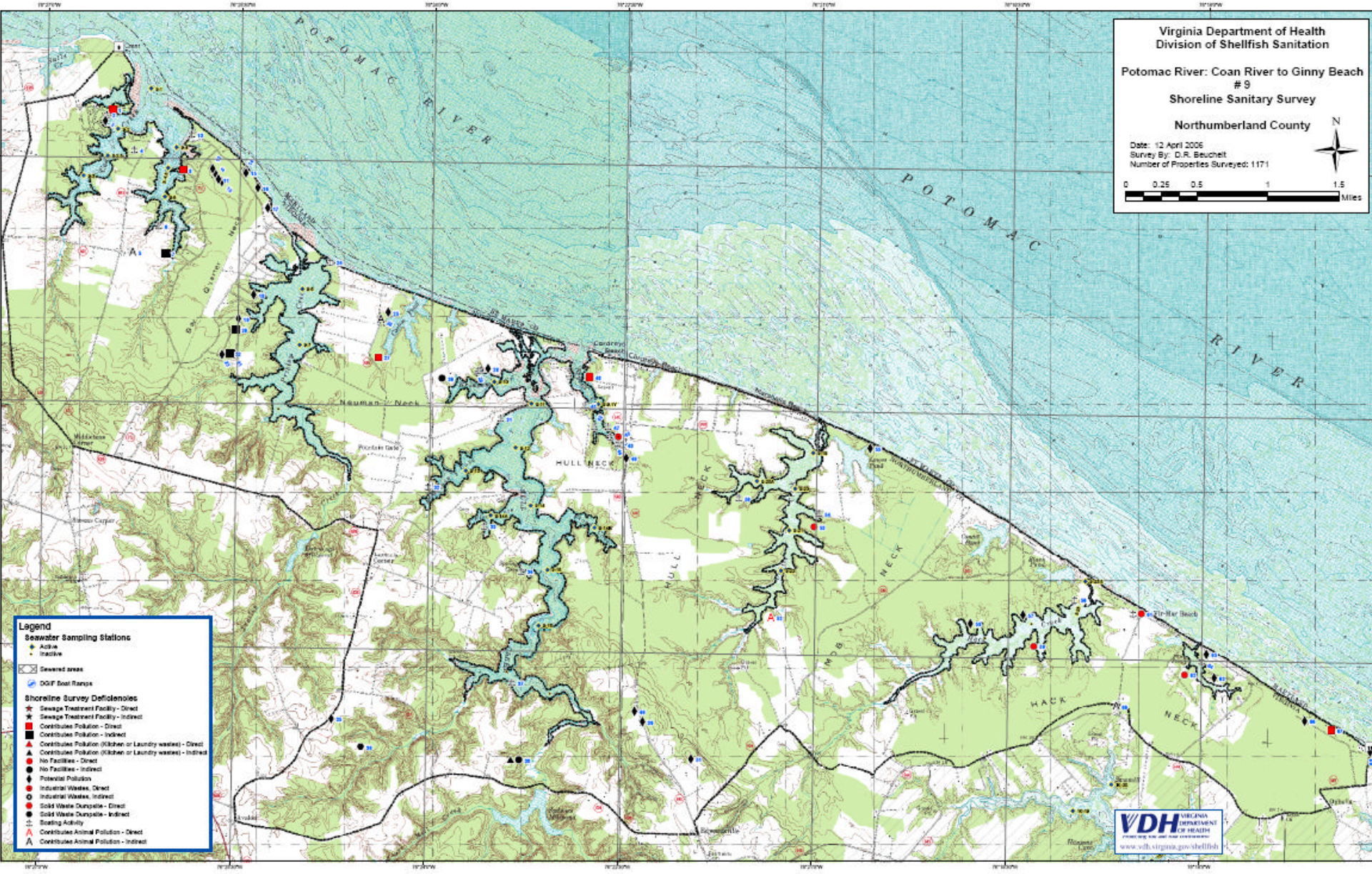
BST Results by Subwatershed

11 Samples each, 10/2005 – 9/2006



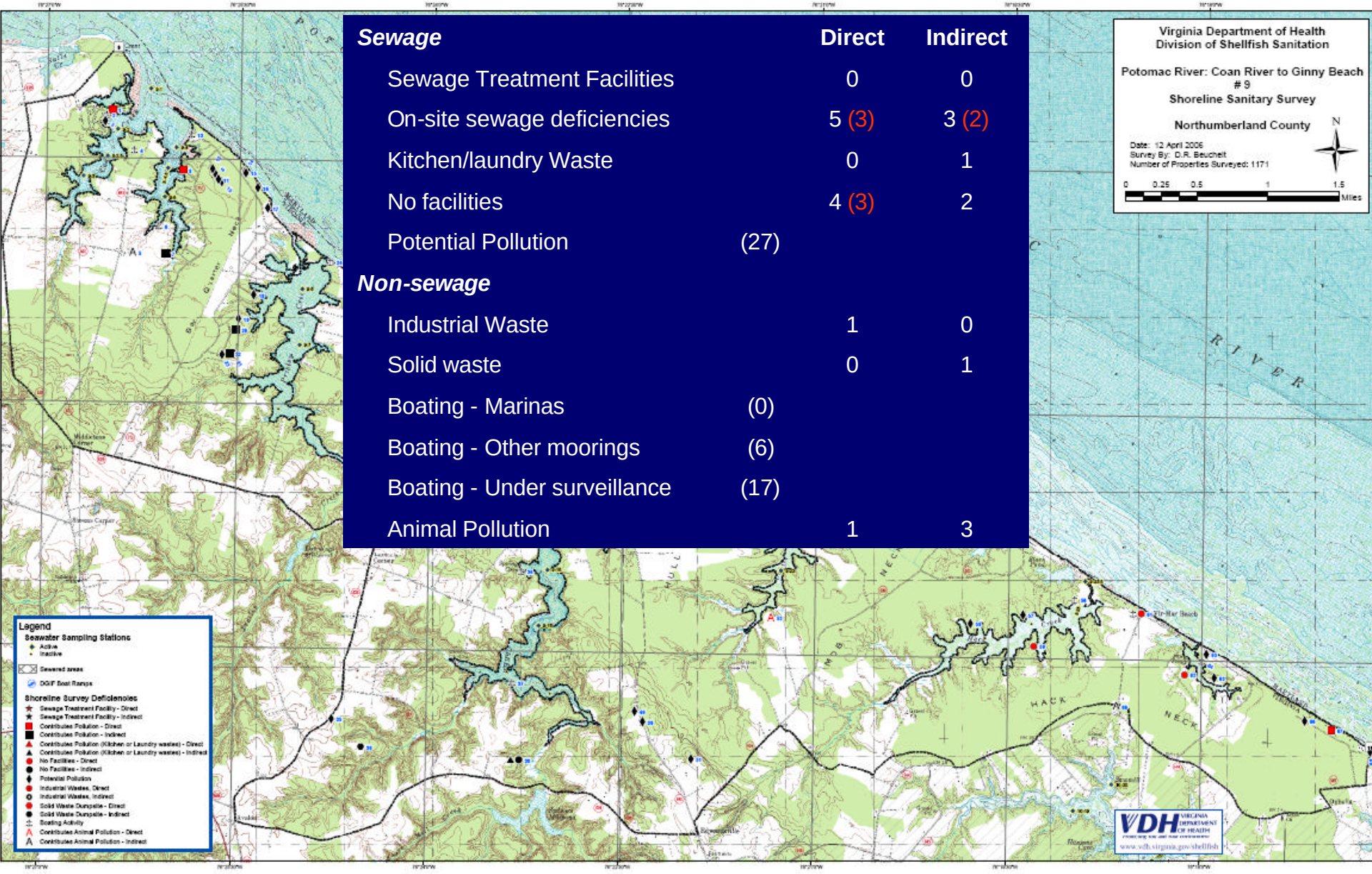


VDH Shoreline Sanitary Survey, April, 2006



VDH Shoreline Sanitary Survey, April, 2006

Sewage		Direct	Indirect
Sewage Treatment Facilities		0	0
On-site sewage deficiencies		5 (3)	3 (2)
Kitchen/laundry Waste		0	1
No facilities		4 (3)	2
Potential Pollution	(27)		
Non-sewage			
Industrial Waste		1	0
Solid waste		0	1
Boating - Marinas	(0)		
Boating - Other moorings	(6)		
Boating - Under surveillance	(17)		
Animal Pollution		1	3



Population Estimates

From calculations based on land area per species – data from DGIF, DCR

	Cattle	Chickens	Horses	Ducks	Geese	Deer	Dogs	Raccoon
Cod	9	3	0	266	198	43	46	66
Presley	26	5	2	240	179	84	89	121
Bridgeman	2	0	0	99	74	5	5	6
Rogers	2	0	0	54	40	6	6	8
Hull	32	8	2	342	255	129	136	208
Cubitt	7	2	0	244	181	48	53	85
Hack	8	3	0	217	162	47	51	91

Next Steps…

- 30 Day Public Comment Period

Ends July 23, 2009

- TMDL Development Continues…
- Final Public Meetings
- Final 30 Day Public Comment Period
- Report Submitted to EPA and SWCB for approval
- Implementation Planning

DEQ
VIRGINIA DEPARTMENT OF ENVIRONMENTAL QUALITY

Questions?? Comments??

Please send written comments or questions to:

DEQ - Piedmont Regional Office
Attn: Margaret Smigo
4949-A Cox Road
Glen Allen, VA 23060
Email: mjsmigo@deq.virginia.gov

Please include name, address, email, telephone #

Presentation is available at:
http://www.deq.virginia.gov/tmdl/mtgppt.html

TMDL Website: http://www.deq.virginia.gov/tmdl

DEQ
VIRGINIA DEPARTMENT OF ENVIRONMENTAL QUALITY